REMARKS

Applicants are amending their claims in order to further clarify the definition of various aspects of the present invention. Specifically, Applicants are amending claim 1 to recite that the epoxy resin cured product contains a skeletal structure represented by the formula (1) in an amount of "45%" by weight or higher. That is, Applicants have incorporated the subject matter of claim 20 into claim 1. In light of this amendment of claim 1, Applicants have cancelled claim 20 without prejudice or disclaimer.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the reference applied by the Examiner in rejecting claims in the Office Action mailed April 29, 2008, that is, the teachings of U.S. Patent No. 5,637,365 to Carlblom, under the provisions of 35 USC 102 and 35 USC 103.

It is respectfully submitted that the teachings of the applied reference would have neither disclosed nor would have suggested such a gas-barrier container as in the present claims, having at least one gas-barrier layer made of an epoxy resin cured product that is formed by curing an epoxy resin composition consisting essentially of an epoxy resin and an epoxy resin-curing agent, and containing a skeletal structure represented by the formula (1) in claim 1 in an amount of 45% by weight or higher, the gas-barrier layer having an oxygen permeability as set forth in claim 1. See claim 1.

As discussed in more detail infra, it is respectfully submitted that the applied reference, Carlblom, discloses a gas-barrier coating wherein the amount of amine needs to be rendered low in order to reduce oxygen permeability and reduce the yellowing of the coating layer. That is, and as illustrated in claims 1 and 14 of

Carlblom, the amount of amine is 7 wt.% or less in the whole barrier layer (in the case of xylylenediamine, 34 wt.% or less), preferably 4 wt.% or less (in the case of xylylenediamine, 19 wt.% or less). Thus, it is respectfully submitted that the disclosure in Carlblom would have taught away from the presently claimed structure, including the gas-barrier layer made of an epoxy resin cured product containing a skeletal structure represented by the formula (1) in an amount of at least 45% by weight.

Furthermore, it is respectfully submitted that Carlblom would have neither taught nor would have suggested such gas-barrier container as in the present claims, having features as discussed previously in connection with claim 1, and, additionally, wherein the container has further features as set forth in the dependent claims in the application, such as further definition of amount of skeletal structure presented by the formula (1) contained in the epoxy resin cured product of the gas barrier layer, as in claim 21; and/or wherein the epoxy resin contains an aromatic ring in a molecule thereof, as in claim 22, more specifically, wherein the epoxy resin contains moieties as in claims 3-5; and/or the further definition of the epoxy resin-curing agent as in claims 6, 12, 16 and 17; and/or wherein the container is produced by forming a gas-barrier laminated film or sheet containing at least one flexible polymer layer and at least one gas-barrier layer as in claim 8, with the flexible polymer layer being defined as in claims 9 and 10, and note also claim 14; and/or blending ratio between the epoxy resin and the epoxy resin-curing agent as in claim 11; and/or wherein the container is in the form of a hollow container, with 60-100% of a surface area of at least one of the inner and outer surfaces of the container being coated with the gas-barrier layer (note claims 13, 18 and 19).

The present invention is directed to gas-barrier containers, suitably used for purposes of receiving and preserving fruits, beverages, drugs, etc.

In recent years, as packaging materials for receiving and preserving contents, plastic films or containers have been predominantly used due to transparency, light weight and economical advantages thereof.

Recently, as containers for foods or beverages, hollow containers mainly made of polymers have been increasingly employed instead of conventional glass or metallic containers; however, the hollow containers mainly made of polymers are deteriorated in barrier properties to oxygen or carbon dioxide as compared to those made of glass or metals, and are unsuitable for preserving foods or beverages therein for a long period of time.

In view thereof, there have been proposed and practically used, hollow containers having a multi-layer structure including a layer made of a gas-barrier resin such as polyamide. However, production of the multi-layer hollow containers inevitably requires the use of a molding machine having a complicated structure, and it has been demanded to develop gas-barrier hollow containers that can be produced more simply.

There have also been known hollow containers mainly made of polymers, which have been coated with polyvinylidene chloride resins. However, since the resins contain halogen atoms, the formed containers suffer from problem such as environmental pollution or generation of harmful gases such a dioxin upon incineration thereof.

It has also been proposed to form a thin film of carbon or silica on inner surfaces of a stretch blow-molded hollow container made of polyester. However, this

requires processing under high vacuum conditions, and inevitably requires use of large-scale apparatuses.

Thus, it is still desired to provide a container having gas-barrier properties whereby materials, such as fruits or beverages, can be preserved for a long period of time in the container, even under high-humidity conditions, and which can be produced by simple processing.

In view of the foregoing, and as a result of extensive research by the present inventors, the present inventors have found that when a gas-barrier layer, made of an epoxy rein cured product that is formed by curing an epoxy resin composition consisting essentially of an epoxy resin and an epoxy resin-curing agent, that contains the skeletal structure represented by formula (1) in claim 1 in an amount of at least 45% by weight, is used, the resultant container is excellent in not only a gas-barrier property, but also various other properties such as transparency, retorting resistance and impact resistance, and such container (including the gas-barrier layer of the cured product) can be formed by relatively simple processing. Moreover, by utilizing such gas-barrier layer for the gas-barrier container as in the present claims, and wherein the gas-barrier layer has an oxygen permeability as in all of the present claims, objectives according to the present invention are achieved. That is, the gas-barrier container is less of a burden on the environment, due to use of non-halogen gas-barrier materials, and is excellent in economical efficiency and workability in production processes in forming such container. The gas-barrier container according to the present invention exhibits an extremely good gas-barrier property and is excellent in various properties such as interlaminar adhesion strength, gas-barrier properties under a high-humidity condition, impact resistance and retorting resistance. Note pages 37 and 38 of Applicants' specification.

It is emphasized that in the container of the present invention, the at least one gas-barrier layer is made of an epoxy resin cured product that contains a skeletal structure represented by the formula (1) in claim 1 in an amount of 45% by weight or higher. Such gas-barrier layer has improved (that is, reduced) oxygen transmission rate. This can be seen in Table 2 of the specification of the above-identified application, set forth on page 36 of Applicants' specification. Thus, note that in Example 10, described on page 34 of Applicants' specification, the content of the skeletal structure represented by the formula (1) in the epoxy resin cured product was 39.8% by weight, outside the scope of the present claims. In comparison, attention is respectfully directed to Examples 5-9 described on pages 32-34 of Applicants' specification, having a content of the skeletal structure represented by the formula (1) in the epoxy resin cured product of at least 56.5% by weight, within the scope of the present claims. As seen in Table 2 on page 36 of Applicants' specification, the oxygen transmission rate in connection with Example 10 was greater than that in each of Examples 5-9. That is, it is respectfully submitted that these Examples show an unexpectedly better (reduced) oxygen transmission rate for structure having an epoxy resin cured product containing the specified skeletal structure in an amount within the scope of the present claims, as compared to that outside the scope of the present claims. It is respectfully submitted that this evidence in Applicants' specification must be considered in determining patentability. See In re DeBlauwe, 222 USPQ 191 (CAFC 1984). This evidence shows unexpectedly better results achieved according to the present invention.

Carlblom discloses resins having gas barrier properties, curable barrier coating compositions utilizing these resins, and packaging materials and/or containers including the barrier coatings. The coatings disclosed in this patent are

the cured reaction product of a polyamine with a polyepoxide having a specified structure as set forth in column 2, line 40, of this patent. Note, in general, column 2, lines 34-45. This patent discloses that the coatings described therein have exceptionally low oxygen permeability at amine hydrogen to epoxy equivalent cure ratios lower than 1.5 to 1, and that the amine nitrogen content of these cured coatings may be less than 7%, with good results being attainable as low as 4% or lower, the relatively lower amine content generally having the advantage of less yellowing of the coating over time. See column 2, lines 25-33. Note also column 2, lines 46-60. This patent goes on to describe that preferred polyamines for reacting with the polyepoxides for curing the coatings are aromatic-containing polyamines having groups of the type > NRΦRN <, where R is alkyl containing 1 or 2 carbons, and Φ is phenylene or naphthylene. See column 2, lines 61-65. Note also column 3, lines 1-6. Note, further, column 4, lines 1-10, disclosing a packaging material including at least one layer of a relatively gas-permeable polymeric layer and at least one layer of a polyamine-polyepoxide barrier coating. See, also, column 6, lines 38-52. Note, further, column 10, lines 18-26.

It is emphasized that according to Carlblom, the amine nitrogen content is to be kept low, e.g., less than 7%, which generally has the advantage of less yellowing of the coating over time. It is respectfully submitted that such disclosure as in Carlblom would have neither taught nor would have suggested, and in fact would have taught away from, the presently claimed subject matter, including wherein the epoxy resin cured product contains a skeletal structure represented by the formula (1) in an amount of 45% or higher.

In connection with previously considered claims 20 and 21, as set forth in the third paragraph on page 4 of the Office Action mailed April 29, 2008, the Examiner

contends that in Carlblom the skeletal structure comprises at least 64% of the curing agent, the Examiner referring to column 8, lines 65-67, of Carlblom. However, note that in column 8, lines 59-65, Carlblom describes that cured networks contain a combination of specific groups comprising at least 65%. That is, the combination of the listed three groups comprise at least 65%; it is respectfully submitted that Carlblom is silent regarding the amount of skeletal structure represented by the formula (1) in present claim 1, in the cured structure of Carlblom.

For example, if xylylenediamine (> N-CH_2-Φ-CH_2-N<) is employed in Carlblom, in connection with the aforementioned disclosure in column 8, lines 59-65 of Carlblom, with an amount of amine being 7 wt.% or less in the whole barrier layer, as described in column 2, lines 27-29, of Carlblom, the amount of xylylenediamine would be 34 wt.% or less, so the skeletal structure represented by the formula (1) in the epoxy resin cured product would be 34 wt.% or less. As seen in the foregoing, it is respectfully submitted that Carlblom would have taught away from the subject matter of the present claims, including, inter alia, wherein the epoxy resin cured product contains a skeletal structure represented by the formula (1) in an amount of 45% by weight or higher.

At the very least, the evidence of record in Applicants' specification, discussed supra, establishes unexpectedly better results in reduced oxygen transmission for the present invention, including amount of skeletal structure of formula (1) as in the present claims, establishing unobviousness of the presently claimed invention.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently pending in the above-identified application are respectfully requested.

To the extent necessary, Applicants hereby petition for an extension of time under 37 CFR 1.136. Kindly charge any shortage of fees due in connection with the filing of this paper, including any extension of time fees, to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Account No. 01-2135 (case 396.44491X00), and please credit any overpayments to such Deposit Account.

Respectfully submitted,

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